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OFFICE OF SPECIAL PROJECTS

1965 - 1970

VOLUME TWO CHAPTERS III-IV & SOURCE REFERENCES

OSP-1

by

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Approved by:

Carl E. Duckett
Director
Science and Technology
June 1973

NRO review(s) completed.

HISTORICAL STAFF

CENTRAL INTELLIGENCE AGENCY

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III. OSP Operations, 1965-1970

A. CORONA

1. 1965-66 Operations

In the early part of 1965, after Mr. Crowley had been appointed senior CORONA project officer, he encountered some of the bitterest of the Air Force/CIA squabbles which had been going on for some time with regard to the management of the CORONA program. Additional heat was engendered at that time by the competition between the CIA [REDACTED]

[REDACTED]

The machinations by the Air Force and NRO Staff to squeeze CIA out of the picture had brought relations between Dr. Wheelon and Dr. McMillan almost to an impasse.

Mr. Crowley made a very strong effort to quiet dissension at the working level of CORONA, particularly between the Air Force and [REDACTED] [REDACTED] who were coordinating and continuing the J-1 series of CORONA launches. Mr. Crowley worked closely with Brigadier General James Stewart, then Director of the NRO Staff, in order to smooth out misunderstandings and to encourage their respective troops in the field to communicate more closely. One example of the types of

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friction stirred up resulted from a unilateral action by General Greer's people in February 1965, postponing a J-1 CORONA shot because of the shelf life of the nosecone. While this action was technically correct under Air Force procedures, it was taken without prior consultation with CIA, and as a result a row developed between Colonel Heran and his SPO 241 group and the senior CIA officer at [] [] then [] Meetings among Agency, Air Force and manufacturer (GE) were held with a view to establishing a more valid shelf life with regard to the flightworthiness of the nosecone heat shield. During this period of stress Mr. Crowley bent every effort to bring calm and reason into the picture, making himself available for meetings on the West Coast and at the manufacturer's plant, until the matter was settled. 103/

Other disagreements arose with regard to the DNRO's insertion of [] into the CORONA West Coast set-up as systems engineers under Air Force contract. CIA countered by advising the DNRO and the subcontractors on CORONA that contractors would respond only to written direction of the CIA Contracting Officer. 104/

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The CORONA management problem was still unsettled when the new NRO Agreement was signed in August 1965. With the promise of better relations still to be fulfilled, Mr. Crowley, as the new Director of Special Projects, presented a management proposal to the Chief of the NRO Staff for consideration. He called attention to the fact that, despite the ill-defined policies and procedures for Government direction of CORONA and the differing interpretations placed upon them, there still remained on the part of both groups a motivation toward program success, as evidenced by accomplishments of CORONA to date. He listed the various management structures which might be employed and gave his own backing to a set-up with a CIA manager as program director, and an Air Force manager as deputy. As a second option, he recommended continuation of the present co-manager structure, but with specific responsibilities being more clearly spelled out. 105/

Mr. Crowley's recommendations were based upon CIA's performance and experience in conducting the technical and on-orbit camera programming for CORONA and its possession of the necessary and peculiar assets to continue the successful management of the program. He said

...It is recognized that the primary mission is the photographic collection of intelligence and the overwhelming majority of commands are directed to the Payload System while on orbit. It therefore follows that the agency responsible for the development of the payload is the most intimate and knowledgeable with its characteristics and performance capabilities and should control not only the primary functions, but also the secondary functions while in operation to assure insofar as possible mission attainment. This is particularly true when the Payload System is undergoing continual development and modification to improve the overall performance of the Program. 106/

The working out of the management of CORONA was a part of the whole problem of implementing the new NRO Agreement, the initiation of the CIA-proposed CORONA Improvement Program, and the assignment of other projects under the NRP. On 22 September 1965 Dr. Wheelon, at the D/SP's request, advised the DCI that settlement of these interrelated NRP matters would be held in abeyance, due to Dr. McMillan's unfavorable attitude toward the preliminary joint solutions proposed, until Dr. McMillan's departure and replacement by Dr. Alexander Flax, the new DNRO, on 1 October 1965. 107/

Operationally, in 1965 CORONA launches numbered thirteen J-1 (dual payload) photographic satellites (or 26 buckets), of which all went into orbit and all but one bucket were recovered; one additional camera

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malfunction caused loss of a complete film load, and with other malfunctions reduced the usable film retrieved to about 87.5% of the total.*

2. CORONA Management Directive of 22 June 1966

The long-awaited settlement of the CORONA management problem was finally reached in April 1966 when Dr. Flax placed a draft proposal for that purpose on the agenda of the NRP Executive Committee meeting of 26 April. The proposal was discussed and approved in executive session, with the understanding that assignment of the procurement of the Dual Improved Stellar Index Camera to the Director of SAFSP would not give him the right to make any changes in the specifications without the concurrence of the CIA.**

A directive was issued by Dr. Flax on 22 June 1966 for the purpose of setting forth the arrangements and assignments agreed to at the April meeting of the Executive Committee, the principal features of which were as follows:

*Appendix D, Tab 12.

**See III-A-3, below, "CORONA Improvement Program: J-3."

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a. The Director of SAFSP was designated CORONA System Project Director (SPD) with responsibility for over-all system engineering and system integration; over-all system master planning, programming and budgeting; assembly and checkout of the system at the launch pad; launch and mission operations; capsule recovery; and delivery of film to DNRO-designated processing facilities. The SPD's use of the services of [] in a general systems engineering role was accepted with [] engineers having free access to information and data from the payload contractors but exercising no technical influence on matters wholly within the payload sphere. Prior coordination with CIA of contacts with contractors was stressed.

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b. The Director of Reconnaissance, CIA, was made responsible for direction and supervision of the development and production of the CORONA Payload Sub-Assembly (PSA), reporting directly to the DNRO. He was to establish a CORONA Payload Sub-Assembly Project Office (PSAPO) and designate a Director thereof, responsible through the Director of Reconnaissance, CIA, to the DNRO for the total PSA development and production, and to the SPD for over-all system matters.

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c. Additional specific responsibilities were assigned to the SPD, including the Thrust-Assisted-Thor and Thorad boosters; the Agena booster/spacecraft; procurement of the DISIC; acquisition and operation of system assembly facilities (excluding the Lockheed A/P Facility) and launch facilities; on-orbit command and control facilities; and capsule recovery forces and equipments.

d. Specific responsibilities assigned the Director PSAPO, through the Director of Reconnaissance, CIA, to the DNRO, for the total PSA development, production (excluding the DISIC), assembly and test; operation of the A/P Facility; adherence to master system specifications, interface specifications, and master project plans established by the SPD; provision of software support to the Satellite Operations Center before, during, and after missions; assistance to the SPD with regard to pre-launch activities in the Payload Sub-Assembly area at Vandenberg, certifying to its readiness and acting as principal PSA assistant to the SPD during pre-mission planning, on-orbit operations, and post-mission analyses.

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Since the PSA contained the key element of the satellite system (i.e., the camera), its basic structural, dynamic, thermal, power and other requirements were to be given proper weight in determining over-all system configuration and characteristics. In trade-offs within the system, the SPD was directed to attempt to resolve problems with a minimum effect on the sensor. However, both the SPD and the PSAPO were directed to analyze their interface and trade-off problems in terms of a successful over-all system performance.

The CIA was to be responsible to the DNRO for the subsystem engineering, technical direction and contract supervision for the PSA (except DISIC). In clarification of the division of responsibilities, Dr. Flax's directive emphasized that each party must honor the other's prerogatives, granting full and free access to all data, and carrying on properly coordinated informal and direct communication at all levels. In the way of general guidance, Dr. Flax cautioned the two sides

Despite good intentions on both sides, differences in interpretation of this management directive, the question of whether or not a problem has interface implications, etc., probably will occur periodically. When such an instance arises and cannot be settled

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in the field, I desire that the problem be called to my attention promptly for resolution.

The successful implementation of this management arrangement will require the wholehearted cooperation of both CIA and SAFSP. I enjoin each of you to insure that your respective subordinates put forth every effort in that vein. 108/

It remained to be seen if the human factor in the relations between CIA and the Air Force could be "directed" back to the truly cooperative spirit which had prevailed during the very early days of this joint endeavor.

In order to strengthen the CIA management team on the West Coast, Mr. Crowley appointed as over-all program manager [REDACTED]

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[REDACTED] was assigned as technical director, and

[REDACTED] continued in his position as Operations

Officer. Some friction was generated initially due to lack of communication and the giving of conflicting technical directions to staff and contractors ensued. A visit

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[REDACTED] by the DD/SP, Mr. McMahon, was made for the purpose of straightening out the lines of command within the A/P Facility and placing it in its proper perspective under the new CORONA Management Plan. 109/

In 1966 the number of launches of CORONA J-1 systems was reduced to nine (18 buckets) of which

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eight achieved orbit and were retrieved with a usable film yield of about 87%.* On 9 August 1966, CORONA Mission 1036 became the first payload on which all payload readiness work (including film loading) was accomplished at the A/P Facility and the payload was shipped to Vandenberg in flight-ready condition. (This speaks for the capability developed by the CIA CORONA West Coast group to carry out its responsibilities.) Mission 1036 was also the first use of the Thorad booster and the first deployment on a retrograde orbit. The 13-day life of this mission was the longest to date for any reconnaissance satellite. The 20 September 1966 launching of CORONA Mission 1035 was the first use of the Pan-Geometric Camera, and the analysis indicated considerable improvement in the cartographic coverage by the CORONA system. 110/

3. CORONA Improvement Program: J-3

As a result of discussions early in 1965 between Mr. Crowley and Dr. Fubini (then DDR&E), studies were made of the weaknesses of the current "J" system and several improved designs were investigated. Mr. Crowley, with the technical assistance of

*Appendix D, Tab 12.

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25X1 [] initiated studies leading to a program incorporating (a) development of a constant rotator camera (Itek) to provide a capability for flying the system at altitudes below 100 nautical miles; (b) improvement in V/H control, vibration, etc., to improve photographic quality; (c) incorporation of the Double Improved Stellar Index Camera (DISIC) to improve attitude determination and allow better use of the system by the mapping community; (d) development of the Mark VIII recovery capsule to provide a 300% increase in film recovery; (e) on-orbit lifetime extension to 30 days to allow efficient film utilization; and (f) use of the Atlas or Thorad senior booster to provide the required weight margin for the increased payload, and to allow for higher inclination orbits (i.e., 96 degrees). 111/

The DNRO was briefed on the recommended improvements on 21 June 1965; on 29 June he approved the procurement of the constant rotating camera from Itek, the improvement in V/H control and incorporation of the DISIC (procurement of which was later awarded SAFSP); however, he decided to stick with the Douglas Thor as the booster, with a modest upgrading to allow for increased payload weight of the new rotator and stellar

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index cameras. The reason for rejection of recommendations d, e, and f, above, according to [] was primarily that official Washington held the view in June 1965 that it was preferable to retain a launch rate of 12 systems per year rather than increase the film capacity and mission life, and reduce the launch rate. 112/ (This view was modified for the sake of economy during the CORONA stretch-out, 1968-70.)

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Between summer 1965 and the end of March 1966, major progress was made on the design and development of the J-3 constant rotator camera and all camera interfaces were completed. When the CORONA Management Plan was approved by the NRP Executive Committee in April 1966 and later promulgated by the DNRO, the final go-ahead was given for the CORONA Improvement Program; however, the delay in this action had caused the first expected launch to slip from January 1967 to July 1967. The J-3 qualification program went smoothly through to July 1967 when first launch was anticipated. However, in thermal altitude testing both the panoramic and stellar index cameras had problems and therefore the first J-3 was delayed another six weeks. The first J-3 launch (Mission 1101)

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took place on 15 September 1967, and recovery of both buckets was completed on 28 September 1967. The J-3 was considered an outstanding success from a technical standpoint since all design goals were achieved. Problems experienced on the first mission were of a minor nature, correctable without major rework before the next flight of a constant rotator camera was scheduled. The performance was judged to be the best ever from a CORONA system. The J-3 was able to fly a lower orbit and get better photographic scale and more information content per picture, with a resolution of six feet being achieved. 113/

Seven successful J-1 missions (14 buckets) were flown in 1967, and two J-3's (4 buckets), with recovery of almost 100% usable film. Of the Soviet SS-9's and SS-11's identified during this period, about 72% came from CORONA photography; also the detection of the first

25X1 [redacted] Coverage was also obtained of the Arab airfields damaged by the Israelis.

4. CORONA Phase-Out

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[redacted]

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[REDACTED]

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of CORONA in order to obtain the broad search coverage
required [REDACTED] On 20 September
1966, [REDACTED] notified
the Director of Reconnaissance, CIA, that the DNRO's
recommended budget for FY 1968 had set a revised schedule
for CORONA launches [REDACTED]

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on the strength of the longer life of the current satel-
lite systems, as well as for budgetary considerations.
Rather than the launch-a-month coverage considered the
desirable number to meet requirements in previous years,
there were to be ten launches each in FY 1967 and 1968,
nine in 1969, and a reserve of six, to be launched in

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[REDACTED]

[REDACTED]

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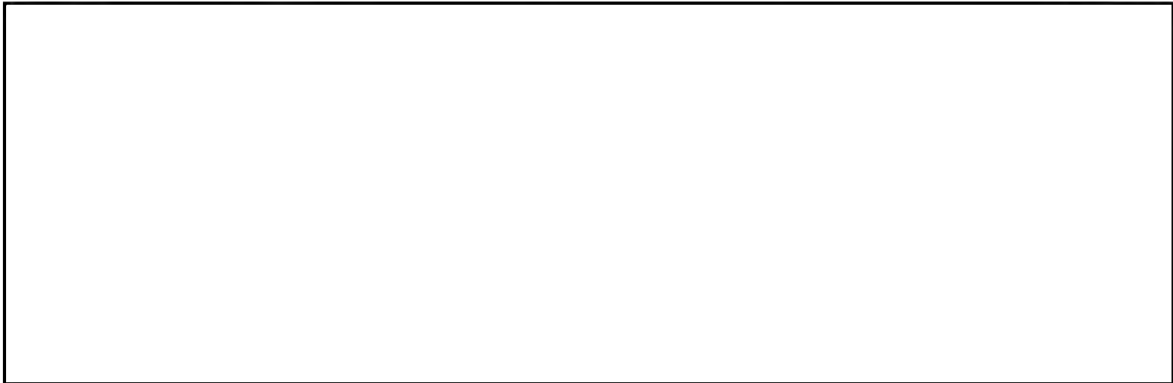
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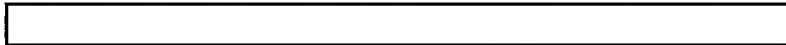
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ten to eight, and further stretching out of the schedule



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In OSP's FY 1969 NRO budget a requirement was included for the procurement of three additional CORONA systems

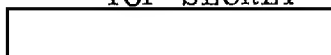


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The DNRO preferred to stretch out the CORONA launch schedule, and no provision was made in doing so for any launch or system failures which might occur, and which in turn would lead to a failure to meet search and surveillance requirements. Two particular weak points in the system were weight constraints due to use of the medium thrust launch vehicle assigned to CORONA, and the shelf age of system hardware. Early philosophy of CORONA had been to schedule 13 flights to assure 12 successes, but in the critical overlap period now developing the DNRO called for a "zero defects" program even though the demonstrated reliability to date for

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both CORONA [] was about 85-90%. 25X1

Mr. Crowley felt strongly that three more CORONA systems should be procured while the contractors were still tooled to supply them. 116/

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1970. On the strength of its report, the Executive Committee decided to approve a recommended stretchout of the remaining CORONA vehicles to allow for [] of CORONA [] and not to order any more CORONA systems but to reconsider the situation in December 1969. 25X1

The failure of the forward-looking camera on J-3 Mission 1107, launched on 23 July 1969, heightened the concern felt by Mr. Crowley for the critical aspects of the CORONA phase-out period, particularly those of personnel attrition at the A/P Facility, the quality assurance program, and the availability of spares. A meeting held on 25 July 1969 examined closely these three problems and as a result the following actions were taken: (a) a previously-planned reorganization was carried out to integrate [] CORONA staffs into a 25X1

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Photographic Systems Division, effective 1 August 1969, in order to make the most efficient use of the experienced personnel available to the D/SP; (b) planning began for the physical transfer of the A/P Facility from [] in order to have available a supply of technicians to replace those [] technicians who were leaving the program as they saw it moving toward termination; because of labor union regulations Lockheed employees could not be placed in the [] facility; and (c) planning was initiated for the procurement of spares and refurbishment of systems, including cost and reliability considerations. 117/

When the [] Review Committee was reconvened in December 1969, the situation was considered

[] and the Committee recommended against further procurement of CORONA systems. 118/ The DNRO on 2 February 1970 submitted the Committee's report to the DCI and encouraged acceptance of the recommendation against additional CORONA procurement. Mr. Helms replied on 5 February 1970 agreeing to the recommendation. 119/ The CORONA schedule stretchout as approved by the NRP

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Executive Committee in June 1969 had shifted from six flights each in FY 1970 and 1971, to five each in FY 1970 and 1971, and two carried over into FY 1972. This was a calculated risk, taken in the face of all relevant concerns: the requirements, the cost, [REDACTED]

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Actual CORONA launches during calendar 1968 were five J-1's and three J-3 constant rotator cameras, all successfully airsnatched, with 97% to 99% usable film recovered. In calendar 1969, the last three of the J-1 systems and three J-3's were launched and retrieved, although several malfunctions which occurred caused the usable film recovery to fall to about 83% for the J-3's and 94% for the J-1's.*

A series of important tests were run in conjunction with the flights of the first five J-3 systems. These were the culmination of efforts begun at the instigation of USIB, which in February 1966 had directed CIA to develop techniques which would enable estimates of crop yields to be made from satellite photography. The payloads of J-3 systems one through five were specially instrumented and contained in some cases tag-on

*Appendix D, Tab 12.

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lengths of special camouflage detection color film, or high speed, high resolution black and white film. The test series accomplished its fundamental purpose of demonstrating the J-3 camera's capability to handle some new photographic techniques due to the added flexibility of having two changeable filters and four changeable exposure slits on each camera, which allowed the use of mixed film loads and/or different filters. None of the missions concerned had their main intelligence purpose degraded by the conduct of these tests. 120/

At the instigation of Mr. Crowley, a CORONA J-3 Ad Hoc Committee was informally convened by the DNRO on 4 December 1967, and formally constituted in February 1968. Its purpose was to analyze and evaluate the experiments conducted on these five test flights. Specific findings of the Committee included the recommendations that further testing of color films and techniques should be conducted against specific intelligence requirements; that a special subcommittee of the U.S. Intelligence Board's Committee on Imagery Requirements and Exploitation (COMIREX) should be constituted to evaluate the utility of satellite color photography; and that a well-planned color collection program be worked out with the close cooperation of the system

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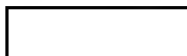
program offices, the SOC, the intelligence analysts, and
the photointerpreters. 121/

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IV. OSP Achievements in Satellite Reconnaissance

A. A Century (and More) of CORONA*

On 24 January 1968 the 100th satellite in the CORONA series was fired from the Pacific Missile Range at Vandenberg Air Force Base and its two film buckets were successfully airsnatched on 1 February and on 8 February 1968, respectively. Congratulatory messages were exchanged between the Director of CIA and the Director of NRO on the accomplishments of this unique satellite reconnaissance program which had been the first to recover objects from orbit; the first to recover intelligence information from orbit; the first to develop a satellite-borne, panoramic, stereoscopic, photo-reconnaissance system; the first to locate the Soviet ICBM deployment; the first to extend mission life and add multiple re-entry vehicles in one mission; and the first to complete 100 missions (three out of four of which were successful in the retrieval of payloads). The contributions of this program to intelligence in the

*This section is based on a paper prepared by the OSP Staff, titled "A Century of CORONA," and sent to the Director of NRO by Mr. John J. Crowley, Director of OSP, on 11 December 1968, as

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uncovering of the unknown, and the contributions to the state-of-the-art of photo-reconnaissance in technical advances make it difficult to overstate the importance of this pioneer program.

The technological improvements engineered under CORONA advanced the system in eight years from a single panoramic camera system having a design goal of 20 to 25 feet ground resolution, to a twin camera panoramic system producing stereo-photography at the same ground resolution; then to a dual-recovery system with an improvement in ground resolution to approximately 7 to 10 feet, and doubling the film payload; and finally, to the J-3 system with a constant rotator camera, selectable exposure and filter controls, a planned orbital life of 18 to 20 days, and yielding a resolution of about 7 feet.

Appendix D to this history contains charts and statistical tables, among which the following are of significance with regard to the accomplishments of the CORONA program.

Tab 9 - Specifications of the various CORONA camera systems.

Tab 10 - A mission-by-mission listing of all CORONA flights from 1959 through 1970.

Tab 11 - A chart of total film buckets launched, orbited, and recovered by series and by years.

Tab 12 - A chart by mission type and by year of the amount of usable film recovered from orbit.

Tab 13 - Chain of events and average time for return to ZI and processing of exposed CORONA film.

Tab 14 - Map display of photo-coverage of Asian land mass accomplished in a six-month period from December 1969 through June 1970.

CORONA satellites had photographed all existing Soviet ICBM bases (25) by June 1964; the information thus



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The CORONA coverage of Soviet rail networks has been relied on to discover any new ICBM complexes since all known ones are served by rail. The program's ability to discover and identify new Soviet silos was unchallenged by any other means of intelligence gathering. CORONA

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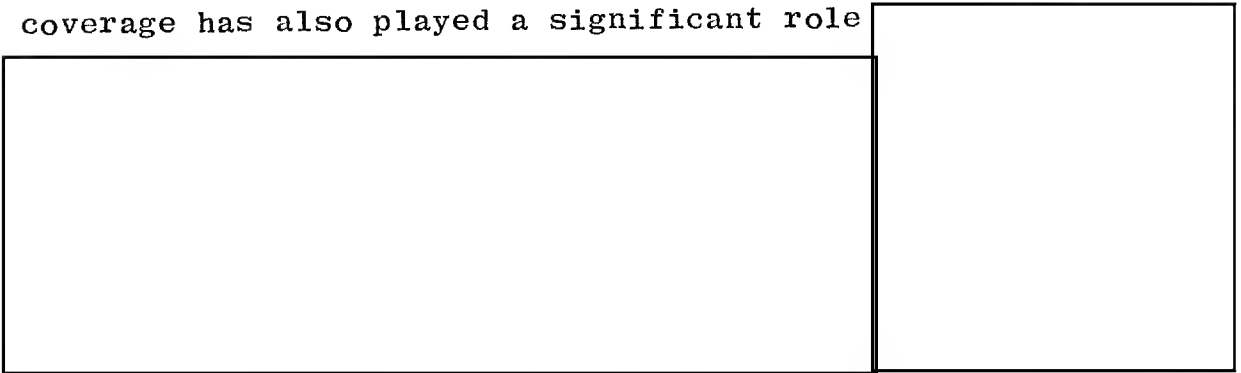
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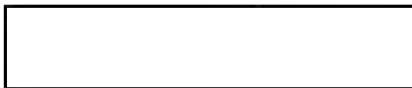
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coverage has also played a significant role

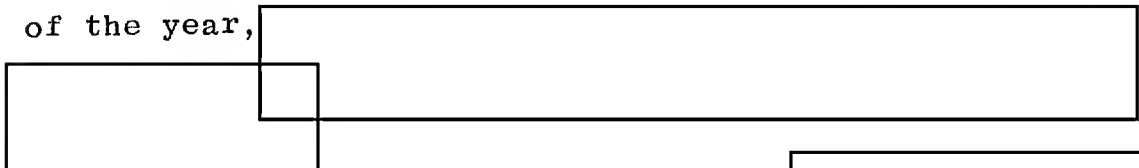


Since the last mainland China overflight by the



with a U-2, on 16 March 1968, CORONA

has been virtually the sole contributor to the national imagery data base on China. A wide variation of standard and special priority requirements have been levied for target coverage for China including area search for strategic missile deployment, monitoring of nuclear and armament producing facilities and status of armed forces, and surveillance of key installations and communications lines. Coverage of China still falls short of the USIB/COMIREX requirements, particularly in the South China area. Satellite photography of this region is the most difficult to obtain of any area of the Communist world due to its being cloud covered approximately 70% of the year,

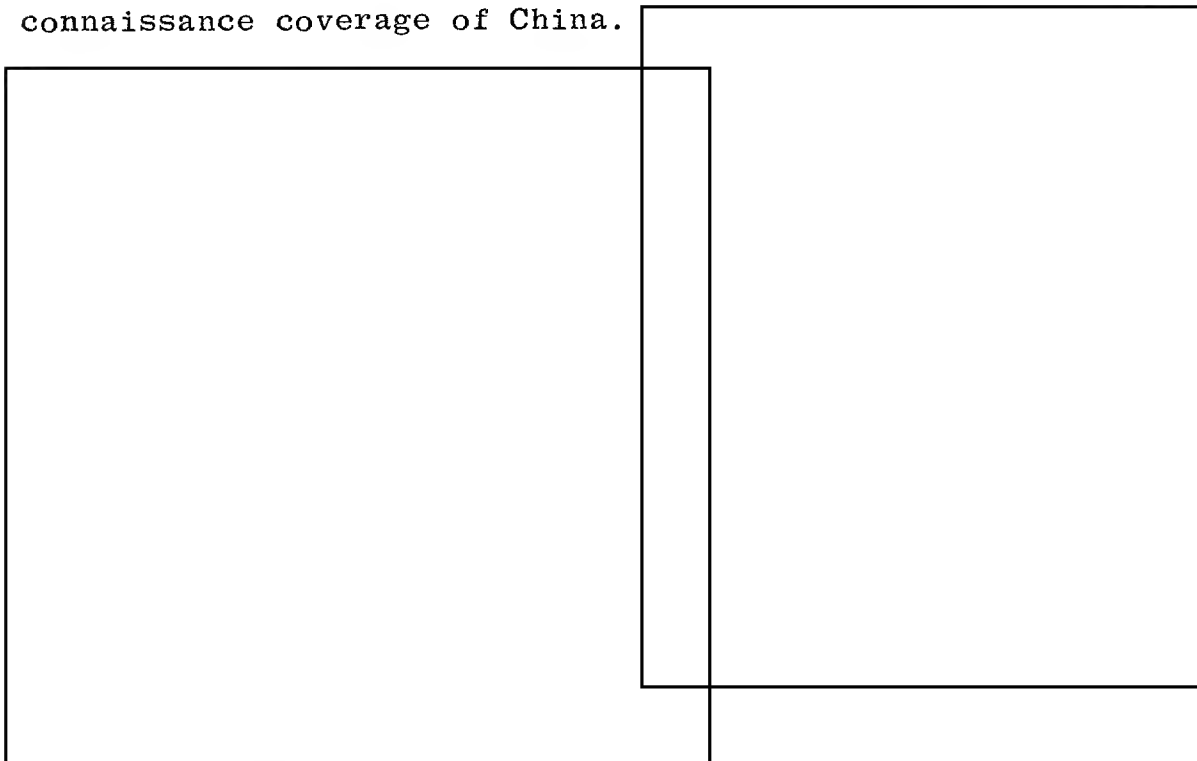


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On 1 May 1969, the China Coordinator for the
NIPE Staff, [] addressed recommendations to
the Chairman of COMIREX for improvements in the photore-
connaissance coverage of China.



CORONA coverage of the Middle East during the
June 1967 war was of great value in estimating the rela-
tive military strengths of the opposing sides after the
short combat period. Evidence was produced of the ex-
tensive damage inflicted by the Israeli air attacks by
actual count of aircraft destroyed on the ground in
Egypt, Syria, and Jordan. The claims of the Israelis

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might otherwise have been discounted as exaggerations but for this timely photographic proof.

Again in 1970, CORONA was called on to provide proof of Israeli-Egyptian claims with regard to cease-fire compliance or violation. CORONA Mission 1111, launched on 23 July 1970, successfully carried out the directions for this coverage, which brought the following praise from Dr. John McLucas, Under Secretary of the Air Force and Director of NRO, who said in a message to Mr. Crowley on 25 August 1970

I extend my sincere thanks and a well done to you and your staff for your outstanding response to an urgent Intelligence Community requirement.

The extension of KH-4 Mission 1111 to 19 days, without benefit of solar panels, and the change in the satellite orbit to permit photography of the Middle East on 10 August provided information which could not be obtained through any other means. This photography is being used as a baseline for determining compliance with the Suez ceasefire provisions. 252/

At the end of 1970 (the cut-off date for this portion of OSP history), the tried and true CORONA system was still, after a decade as the "workhorse" of the National Reconnaissance Program, providing an extended

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C. Support to National Policymakers

In placing a value on the intelligence obtained by the US through its photographic and Sigint reconnaissance satellite programs between 1960 and 1970, a first consideration, on the positive side, would be that it had made it possible for the President in office to react more wisely to crucial international situations when armed with the knowledge provided by these programs. Conversely, it can be said that without the intelligence which these programs have furnished, we might have, misguidedly, been pressured into World War III.

The intelligence collected by OSP's reconnaissance programs makes a vital contribution to the National Intelligence Estimates upon which the defense of the US and the strategic plans of the military services are based. Principal among those Estimates are the NIE-11 and the NIE-13 series with regard to the Soviet and Chinese Communist strategic weapons, space, and nuclear energy programs.

The intelligence from overhead reconnaissance counts heavily not only in planning our defense, but in programming and budgeting for it. It helps to avoid the

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kind of wasteful floundering about such as that which occurred during the time of the projection of the "Missile Gap." Without the kind of intelligence which the National Reconnaissance Program is providing, the US budget for the defense of our own territory, and for military assistance to our allies, would doubtless be increased by billions.

In the Strategic Arms Limitation Talks, begun with the Soviet Union in Helsinki in November 1969, the verification of each country's compliance with the terms of any agreement reached is one of the thorny questions which must be settled, and our photographic and Sigint satellites are among our most important assets upon which verification can be based. Although the US has hopes of negotiating supplementary arrangements in support of verification, including possible selective on-site observation, it may be that only "national means" (i.e., the type of technical collection systems now in use) will be available under whatever agreement is finally reached. In any case, the value of our reconnaissance satellites to the top policymakers in formulating national security policy will not diminish with an arms

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limitation agreement with the Russians, and it will be necessary to maintain and advance our capabilities in this area; also, it will be necessary to continue to protect the security of our sensitive collection systems. It will also be vital to obtain either a formal or tacit understanding with the Russians that neither side will interfere with the other's "national means" of verification. 260/

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